

United States Marine Corps
Command and Staff College
Marine Corps University
2076 South Street
Marine Corps Combat Development Command
Quantico, Virginia 22134-5068

MASTER OF MILITARY STUDIES

TITLE:
MAGTF C2 THE VISION FOR MARINE CORPS
COMMAND AND CONTROL

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

AUTHOR:
MAJOR RUFINO H. GOMEZ
UNITED STATES MARINE CORPS

AY 07-08

Mentor and Oral Defense Committee Member: *[Signature]* PhD

Approved: *[Signature]*

Date: 9 May 2008

Oral Defense Committee Member: *[Signature]* Ph.D.

Approved: *[Signature]*

Date: 9 May 2008

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE MAGTF C2 the Vision for Marine Corps Command and Control				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) United States Marine Corps,Command and Staff College, Marine Corps Combat Development Command,Marine Corps University 2076 South Street,Quantico,VA,22134-5068				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 28	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Executive Summary

Title: MAGTF C2 the Vision for the Marine Corps Command and Control

Author: Major Rufino H. Gomez, United States Marine Corps

Thesis: An analysis of the MAGTF C2 vision reveals that the Marine Corps will need an overall approach that encompasses people, process, and technology to address the flow of information for the commander across all levels of the battlespace.

Discussion: To combat potential threats to the U.S., the Navy, Marine Corps, and the Coast Guard have developed *A Cooperative Strategy for 21st Century Seapower, October 2007*. Command and Control (C2) systems within the Marine Corps need to develop to support this tri-service strategy. In order to support this maritime strategy the Marine Corps Air Ground Task Force (MAGTF) Command and Control (C2) Vision will provide a strategy that enhances lethality and effectiveness across the range of military operations through better decision making, information sharing, and shared understanding.

Conclusion: Information on which to make decisions will never be as complete and clear as the commander desires, but the speed and volume with which it can be gathered, processed, and acted on is the critical factor. The Marine Corps needs to adapt its people, process, and technology to support this MAGTF C2 vision. To support this vision the Marine Corps will have to develop common hardware and software suites that can provide the commander with a fused image of the battlespace.

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

QUOTATION FROM, ABSTRACTION FROM, OR REPRODUCTION OF ALL OR ANY PART OF THIS DOCUMENT IS PERMITTED PROVIDED PROPER ACKNOWLEDGEMENT IS MADE.

Illustrations

	Page
Figure 1. COC Capsets	13

Table of Contents

	Page
EXECUTIVE SUMMARY	i
DISCLAIMER	ii
ILLUSTRATIONS	iii
TABLE OF CONTENTS	iv
PREFACE	v
MAGTF C2 STRATEGY	1
COMMAND AND CONTROL BASELINE	2
THE COMMANDERS INFORMATION NEEDS	4
LEVERAGING THE POWER OF INFORMATION	5
NETWORK CENTRIC WARFARE	7
INFORMATION SUPERIORITY	9
MAGTF C2	10
COMBAT OPERATIONS CENTER	11
COC CAPABILITY	13
COC EMPLOYMENT	14
CHALLENGES	16
CONCLUSION AND RECOMMENDATIONS	18
BIBLIOGRAPHY	20
NOTES	21

Preface

I would firstly like to thank my wife and kids for understanding why I have spent so much time in my study. They have provided this struggling writer and researcher with more encouragement and support than I could have asked for.

I would also like to thank Doctor Swanson for his direction and time in helping guide and refine my endeavor. His insight and knowledge on command and control assisted me greatly.

MAGTF C2 within the Marine Corps continues to be a challenge; the more it is discussed the more understanding that will be generated. I hope that my efforts will contribute to the understanding of this issue.

The U. S. and world economies are heavily dependent on the world's oceans as a conduit for the mass transit of goods and services between countries. Threats to these conduits have a direct impact on the security and stability of the United States and the commerce that flows on these oceans. To combat potential threats to the U.S., the Navy, Marine Corps, and the Coast Guard have developed *A Cooperative Strategy for 21st Century Seapower*, October 2007. Command and Control (C2) systems within the Marine Corps need to develop to support this tri-service strategy. In order to support this maritime strategy the Marine Corps Air Ground Task Force (MAGTF) Command and Control (C2) Vision will provide a strategy that enhances lethality and effectiveness across the range of military operations through better decision making, information sharing, and shared understanding.¹ An analysis of the MAGTF C2 vision reveals that the Marine Corps will need an overall approach that encompasses people, process, and technology to address the flow of information for the commander across all levels of the battlespace. The Marine Corps will need to evaluate how it incorporates its process and people that installs, operates, and maintains C2 systems to support the MAGTF C2 vision.

The Marine Corps portion of the strategy found in *A Cooperative Strategy for 21st Century Seapower* is derived and evolved from the concept defined in *Forward ...From the Sea*. This concept as defined in *Forward ...From the Sea*, expanded the focus and role of naval forces from a maritime role to a force that can project power on the world's littorals. With almost half of the world's population living within the littoral region, the Marine Corps needed to continue to explore and develop strategies that can address potential hot spots within this region. *A Cooperative Strategy for 21st Century Seapower* is an attempt to incorporate all three U.S. maritime forces and provide a common overarching theme that will integrate each of the three services capabilities.

The security, prosperity, and vital interests of the United States are increasingly tied to other nations and their ability to import and export goods with each other. The United States' interests are best served by fostering a peaceful global system comprised of interdependent networks of trade, finance, information, law, people, and governance.² The oceans connect the nations of the world, they provide a transportation avenue for goods coming and going from countries that do not have direct access to the oceans. Because the maritime domain-the world's oceans, seas, bays, estuaries, island, coastal area, littorals, and the airspace above them-supports 90 percent of the world's trade, it carries the lifeblood of a global system that links every country on earth.³ The U.S. economy is dependent on its ability to freely navigate the world's oceans since this method of transportation, is the most feasible when moving large quantities of goods from one nation to another. This dependence has been fueled by the U.S. economic reliance on inexpensive foreign goods that are made with cheap foreign labor.

In order to realize this security and stability this maritime strategy needs a C2 system that will enable maritime forces to enhance their awareness through common and reliable information exchange and understanding platforms. To make this vision a reality our C2 systems need to be designed to support the concepts that are laid out in *A Cooperative Strategy for 21st Century Seapower*. The development of these C2 systems will be critical to accomplishing this maritime strategic concept.

Command and Control Baseline

What is command and control? It is the process by which a commander's intent is expressed to his staff. Without command and control, campaigns, battles, and organized engagements are impossible, military units degenerate into mobs, and the subordination of

military force to policy is replaced by random violence.⁴ C2 depends on the technical and tactical ability of personnel that are trained to properly employ a C2 system. A key component for the employment of C2 systems is the ability of the people that operate these systems. The assumption that forces across the battlespace have a shared awareness that contributes to the staffs understanding of the environment and can formulate recommendations for the commander based on a shared awareness. Command and control can provide purpose and direction for the employment and integration of the C2 system within other systems. The execution and performance of C2 systems can have a multiplying effect on the overall success of a military operation. Command and control helps commanders make the most of what they have—people, information, material, and, often most important of all, time.⁵ The Marine Corps has seen command and control cover the equipment or systems that facilitate command and control and this has been a fundamental requirement for the life and growth, survival, and success of any system.⁶

Command and control takes the understanding of the staff and provides the means by which a commander can recognize what needs to be done and sees to it that appropriate actions are taken. Sometimes this recognition takes the form of a conscious command decision—as in deciding on a concept of operations. Sometimes it takes the form of a preconditioned reaction—as in immediate-action drills, practiced in advance so that we can execute them reflexively in a moment of crisis.⁷ This understanding of command and control is a key component of the MAGTF C2 Vision, since it requires all aspects of C2 systems be synchronized in training, doctrine, and employment of this vision. This synchronization will ensure that information is meeting the commander's requirements throughout the battlespace.

The Commanders Information Needs

The commander seeks a graphical image of the battlefield that depicts enemy location, terrain, and troop dispositions as it relates to friendly and enemy forces. This image has evolved over time from being a mental picture in the commander's head that had to be described to the staff with the use of map boards and grease pencils. The current image of the battlefield is now represented by a computer generated images that depict a multitude of information that has to be fused by the staff. This image, which is the commander's mental model of the battlefield and its contextual surroundings, includes military, political, and psychological considerations. Depending on the situation, the image can have many major components, but it normally comes down to something based on traditional factors of METT-T (Mission, Enemy, Terrain, Troops, and Time available). Further, the image is not merely a depiction; it also includes the commander's understanding of the history of the battlefield situation as well as his projected futures, which rest on his own and the enemy's possible actions. The meaning of any information gained by the commander is driven by the image that frames it, and the value of that information is determined by the manner in which it fits into the image. Therefore, staff members must share their commander's image if they are to understand and supply his information needs. A major purpose of communications in command and control lies in the sharing and representing of images so that the information can be clearly understood by the commander and his staff.

Information needs include not only the content of information but also speed at which the information flows. The traditional view of command communications is that of a linear flow in which the subordinate supplies the commanders with information and the commander in turn

supplies the subordinate with decisions. A better information flow model is one that involves an active exchange of information and a validation response from each level to ensure that the information is accurately passed and received. The intent, guidance, and orders of good commanders are followed by checks for evidence of understanding. This flow is ever moving from higher to lower and vice versa as the situation unfolds. This model provides a constant feedback that is constantly validated and confirmed. The desired end state for this flow is to minimize the fog of war and to provide the clearest picture of the battlefield to the commander. To this end a system that can provide the commander with the clearest and most relevant picture of the battlespace will provide the commander with an information advantage. Technological improvements in mobility, range, lethality, and information-gathering continue to compress time and space, forcing higher operating tempos and creating a greater demand for information.⁸

Leveraging the Power of Information

A military organization needs to look at ways to capitalize on how they process and use information. The Information Age is transforming information from an ordinary commodity into a “golden goose” that can replicate and multiply both information and its value at little or no cost.⁹ The information age has driven down all costs associated with the use of information. The information technology commercial sector has provided people with low cost high bandwidth capability that was a byproduct of the technological boom over the last decade. As an organization the military needs to look at how it can use the benefits that were derived from the low cost in hardware and software. But, as an organization the military needs to weigh the availability and overabundance of low cost hardware and software against our current C2

systems in order to validate their relevance and not create an information stove pipe. The overall factor being that cost alone should not drive the military's procurement process, but that the military can benefit from the availability of commercial off the shelf equipment to shorten the procurement process.

Across a broad range of activities and operations, the time required by individuals to access or collect the information relevant to a decision or action has been reduced by orders of magnitude, while the volume of information that can be accessed has increased exponentially.¹⁰ In some competitive markets, the timelines for creating decisions have been reduced from hours to seconds (electronic commerce, on-line trading, and instant messaging). Consequently, across a wide broad range of activities, the fundamental limits to the velocity of operations are no longer governed by space or time.

The emergence of the Information Age offers the military the opportunity to leverage new sources of power to meet the challenges that the military will face. In particular, the military needs to understand that early transformation requires exploiting information technology to reform defense business practices and to create new combinations of capabilities, operating concepts, organizational relationships and training regimes.¹¹ That is exactly what the transformation of the Department of Defense (DoD) is all about. DoD transformation seeks to reorient the military force and focus its attention on emerging and future missions, changing the way the force fights (operates) to leverage Information Age concepts and technologies, and change business processes to make better use of Information Age organization.¹² Bridging the information availability and providing a framework for the execution of this information requires the expansion of principles in the employment of information dominance.

Network Centric Warfare

Network Centric Warfare (NCW) is a theory of military operations which holds that the seamless networking of the friendly force elements will bring about an increase in combat power.¹³ NCW is a series of connections that takes physical objects (cables, connectors, and equipment) and the people that use them to form a shared awareness. NCW is based on the process of adopting a new way of thinking—network centric thinking—and applying it to military operations. NCW focuses on the combat power that can be generated from the effective linking or networking of the warfighting enterprise. It is characterized by the ability of geographically dispersed forces gaining an advantage over an enemy by leveraging on the friendly forces ability to concentrate and coordinate actions. This characteristic is similar to one of the basic concepts of distributed operations to create a high level of shared battlespace awareness that can be exploited by military forces to achieve the commanders' intent. The distribution of forces and their ability to project power is a key component of the MAGTF C2 Vision. This projection of power will enable commanders to process information and react faster than our enemies. NCW will allow smaller military forces to decisively engage numerically superior forces, by leveraging on technology to provide a distinct advantage in the ability to identify, decided, and target these enemy forces.

NCW supports speed of command the ability of a force to utilize the Observation-Orientation-Decision-Action (OODA) loop process to gain positional and overwhelming force advantage over the enemy. Furthermore, NCW has the potential to contribute to the coalescence of the tactical, operational, and strategic levels of war.¹⁴ In brief, NCW is not narrowly about technology, but broadly about an emerging military response to the Information Age. These

things are necessary, but are not among the key aspects. Instead, the "network" in NCW emphasizes a network of connections between people in the information and cognitive domains. NCW stresses the shared information and situational awareness that leads to increased speed of command and synchronized effects in the battlespace, which should provide an advantage to the military that, can incorporate them into their decision cycle.¹⁵

A key component of the military decision cycle has been derived from Colonel John Boyd, USAF (Ret). According to Boyd's theory, enemy analysis can consist of numerous action and reactions and the ability of one side to react faster, OODA cycles. The OODA Loop, often called Boyd's Cycle, is a creation of Col. Boyd. Each party to a conflict begins by observing themselves, the physical surroundings and the enemy. Next friendly forces will orient themselves. Orientation refers to making a mental image or snapshot of the situation. Orientation is a reaction to what has been observed, this is constantly changing; the chaotic nature of conflicts makes it impossible to process information as fast as we can observe it. After orientation the next step in this cycle is to make a decision, based on the previous orientation. The decision takes into account all the factors present at the time of the orientation. The final step of this process involves the implementation of the decision. Then, because we hope that our actions will have changed the situation, the cycle begins anew. The cycle continues to repeat itself throughout a tactical operation. The important lesson of the OODA loop is the ability to generate speed in command and control which will shorten the time needed to make decisions, plan, coordinate, and communicate.¹⁶ This speed will allow friendly forces to achieve information superiority over the enemy by constantly having a better understanding of the battlefield situation.

Information Superiority

Joint Vision (JV) 2010 parallels the changes that are taking place in pioneering commercial organizations that are being transformed into Network Centric Enterprises. JV 2010 asserts that the operational concepts of dominant maneuver, precision engagement, full-dimensional protection, and focused logistics will be enabled by information superiority.¹⁷ The desired end-state is full spectrum dominance. Information superiority, as currently defined in Joint Pub 3-13 Information Operations, and addresses only the achievement of a superior information position, the ability to collect, process, and disseminate an uninterrupted flow of information while exploiting and/or denying an adversary's ability to do the same.

In drawing a parallel from the discussion of the commercial sector, the view of Information Superiority in military operations as a state that is achieved when competitive advantage (full-spectrum dominance) is derived from the ability to exploit a superior information position.¹⁸ In military operations this superior information position is, in part, gained from information operations that protect abilities to collect, process, and disseminate an uninterrupted flow of information while exploiting and/or denying an adversary's ability to do the same. As in the commercial sector, information has the dimensions of relevance, accuracy, and timeliness.

The desired effect of offensive information operations is to achieve a much better position than our enemy as it relates to our ability to collect, process, and disseminate information. The desired effect of defensive information operations is to keep our information from being compromised by the enemy. Clearly, information superiority is a comparative or relative concept. Furthermore, its value is clearly derived from the military outcomes it can enable. In this sense, it is similar to air superiority or sea control. These capabilities are not valued for themselves, but for making extended offensive and defensive actions more effective.

Achieving information superiority increases the speed of command preempting enemy's options, creates new options, and improves the effectiveness of selected options. This promises to bring operations to a successful conclusion more rapidly at a lower cost. The result is an ability to increase the tempo of operations and to preempt or blunt our military adversaries' initiatives and options. Information superiority is generated and exploited by adopting the network-centric concepts, pioneered in the commercial sector that allows organizations to achieve shared awareness and self synchronization. The bottom line is military operations that can utilize detection, identification, and destroy the most important targets at any given time.¹⁹ How the military intends to accomplish this information dominance will rely on the military's ability to employ its current and future C2 systems.

MAGTF C2

The ability to plan, rapidly replan, and distribute decision-making through situational awareness and the commander's intent are critical to increasing our tempo of operations and are enabled by digital C2 systems.²⁰ The ability to share information is currently limited by how the military employs its C2 systems. Systems have been designed to support a specific warfighting function and have relied on information technology (IT) to increase the speed of the decision cycle in the hope that this will improve situational awareness. The developments of these C2 systems were designed to provide a single view with limited injectors; what needs to be incorporated is the ability to view multiple displays that are being provided information from many different systems in a combined picture. This has caused a bottleneck when commanders and staffs are required to view multiple systems in order to achieve a combined battlespace picture. The way personnel view information has evolved from placing unit symbols on a map

to having those symbols graphically represented on a computer screen. The Marine Corps is in the process of ensuring that C2 is able to be rapidly deployed and can support the commander's ability to view the battlespace and contribute to his overall awareness. In the MAGTF C2 Vision, the Marine Corps will employ the MAGTF Combat Operations Center (COC), a common, modular, and scalable operational entity that facilitates C2 across the full spectrum of MAGTF operations.

Combat Operations Center

As an arrangement of personnel, equipment, communications, and facilities, it is employed by a Commander to plan, direct, coordinate, and control forces and operations in the accomplishment of the mission. The COC's contribution to the overall expeditionary, interoperable, and networked nature of the MAGTF enhances Joint Force operations. Utilizing a common, modular, and scalable set of hardware and software/applications, the COC will provide the initial capability increment by combining existing elements of MAGTF C2 into an integrated operational system with increased levels of commonality, functionality and interoperability. Providing Marines with planning and execution tools capable of effectively executing the Commander's intent, the COC will be the composite solution capable of swiftly executing vital MAGTF C2 functions in both current and emerging operational environments.

Operating in a network centric environment, the COC will allow decision-makers at every echelon to access the same information. To this end, it will provide Marines with a common viewer that provides a shared situational understanding capable of correlating, fusing, and associating real-time, near-real-time, and other data from a variety of national through

tactical sources onto a single screen. A fully networked, interoperable, and interdependent joint force is essential to the achievement of successful military operations now and in the future. Core-C2 capability gaps addressed by the COC in the execution of combat operations based on the Joint Command and Control (JC2) Program include:²¹

- Develop and Maintain Shared Situational Awareness and Understanding
- Communicate Commander's Intent and Guidance
- Plan Collaboratively
- Synchronize Execution Across All Domains
- Monitor Execution, Assess Effects, and Adapt Operations

As the Joint Capability Developer, USJFCOM advances warfighter effectiveness, improves combat capability, and helps minimize fratricide by leading the combatant commands, services, agencies, and multinational partners in the interdependent and integrated development and transition of Joint Warfighting Capabilities.

In September 2006, the Deputy Secretary of Defense designated USJFCOM to lead a trial program as the JC2 Capability Portfolio Manager (JC2 CPM). In this capacity, USJFCOM has established a JC2 CPM capability function, characterized by short reporting lines, and close coordination with service C2 programs.

USJFCOM, along with a multitude of partners, is working to establish the technical expertise and attendant authorities necessary to eliminate unnecessary duplication, close capability gaps, and ensure joint integrated capability solutions for the warfighter. The goal of JC2 CPM is to develop operational level forces and headquarters with the organic ability to fight as part of a joint and combined force alongside our multinational and interagency partners. The command's integration efforts will yield a joint command and control capability that ensures decision makers

receive information when they need it, allowing them to observe, orient, decide, adjust and act faster than an adversary.

COC Capability

The COC will be delivered in five different Capability Sets (CAPSETs), which equate to the varying echelons of command from a battalion to a Marine Expeditionary Force (MEF) command element. A CAPSET I

COC will address the C2 functionality required at the MEF level; the COC CAPSET II will address the Marine Subordinate Command level; the COC CAPSET III will address the C2 functionality required at the

infantry regiment, Combat Logistics Regiment (CLR) and Marine Air Group (MAG) level; the COC CAPSET IV will address the C2 functionality required at the infantry battalion, Combat Logistics Battalion, and Squadron level; and the COC CAPSET V will address the C2 functionality required at below the Battalion or Squadron level. The initial increment of the MAGTF COC will provide the following:

The initial spiral will focus on the integration of the common operational picture that focuses on ground and air units for a shared situational awareness. The follow on spirals will utilize a building block approach that builds off of the previous spiral by providing a fully

COC CAPSETS

MEF COC	Conceptual	MEF
AN/TSQ-239(V)2	Planning stage	Major Subordinate Command
AN/TSQ-239(V)3	In production	Regt/Group
AN/TSQ-239(V)4	In production	Bn/Sqd

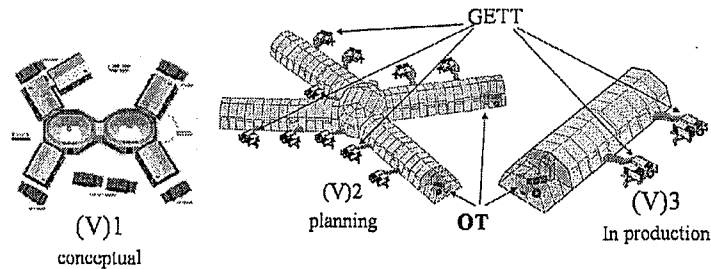


Figure 1

integrated MAGTF C2 COC with refined scalability and modularity.²² Once fielded, these two COC capability increments will provide a common, modular and scalable C2 solution across the MAGTF to support the entire range of Marine Corps operations. Additionally, through its incremental delivery of the above capabilities, the COC will contribute significantly toward the fulfillment of the objective outlined in Joint Requirements Oversight Council Memorandum (JROCM) 163-04. As part of an effort to achieve a single Joint Blue Force Situational Awareness (JBFSa) capability based on existing Service capabilities documents, this JROCM mandated implementation of an Army/Marine Corps convergence plan. By providing integrated C2 and a comprehensive COP (with all required injectors), the COC will advance the Marine Corps towards this goal.

COC Employment

The COC will be capable of being both rapidly deployed and flexibly employed using a turnkey implementation. This is in sharp contrast to how COCs have been pieced together by the operating forces from program of record C2 systems and commercial information technology equipment. Its shelter environment needs to be able to deploy (setup time) quickly and include a network of workstations supporting standard Tactical Data Systems (TDSs) and other mission critical software and have displays that can take input from any workstation. Equipment commonality and modularity, to include integrated tents, trailers, radios, power generation, and other tactical hardware and supporting infrastructure that can be deployed via air, ground, or sea, will help to ensure rapidity with regard to deployment.

In order to remain a viable solution for the delivery of evolving capability objectives, the COC will maintain a flexible, open architecture design. This will effectively accommodate evolving requirements to support technology insertion when and where appropriate. This open design also reinforces the modular and scalable nature of the COC, allowing it to integrate new or upgraded TDSs as desired to provide improvements in capability that the commander can then utilize. For instance, as an open architecture product, it will provide integrated displays, processes, data feeds, and other required tools for a full spectrum JBFSA and C2 capability that provides the collaborative planning and execution tools needed by a Commander to conduct joint and multinational operations. It will improve command-level visualization, collaboration and decision-making capabilities and ensure shared understanding of the Commander's guidance and intent. Development and fielding of COCs may proceed along evolutionary acquisition development spirals; although their capabilities are described in increments, materiel development to provide those capabilities may require the use of acquisition spirals. As defined in CJCSI 3170.01 E, an increment is a militarily useful and supportable operational capability that can be effectively developed, produced or acquired, deployed and sustained.

Spiral development is an instance of an incremental development strategy where the end-state is not known.²³ But, as the system develops it incorporates the previous spirals capability and as it evolves it becomes more interoperable. There are multiple benefits of using an evolutionary spiral approach: maximizing the exploitation of technological advances, in which technology is spiraled to maturity and injected into the delivery of an increment of capability; allowing COC operators to provide input into the acquisition process itself, thus improving overall capability development through end-user involvement; and, by remaining aware of

known external risks and dependencies, ensuring compatibility with systems that will be expected to interface and interoperate with the COC.²⁴

The reality of today's COC is that there is not a Military Occupational Specialty (MOS) to operate the COC's C2 systems. Each individual warfighting function (maneuver, fires, and logistics) normally assigns the duty of learning and operating the C2 system as an additional duty to one of their smart Marines. Certain MOS provide individual instruction and understanding of one specific system, but the key is having a block of instruction that covers the total integration of the varied C2 systems. The G-3/S-3 operations chief has overall responsibility for the layout and operation of the COC, but the operations chief only receives a very limited understanding of all the C2 systems in his operations chief's course.

Challenges

The most critical element in operating our C2 systems is the Marines that will be required to operate this system. It would be an erroneous belief by the leadership to think that the current C2 systems and personnel trained to operate these systems will have all the required training necessary to properly employ these systems. These new C2 systems that support the MAGTF C2 Vision will require a much more highly specialized and trained individual to operate them. A recommendation to address this personnel issue would be to restructure the communication MOS to absorb these new C2 systems. This new MOS could be structured to support the network connections and the operations of these systems. This would provide commanders with a central point for the operation and maintenance of the C2 system. This new arrangement would still

require the staff planners from the different C2 systems to take an active involvement in the planning and employment of the system.

Currently the only element of the MAGTF that utilizes a specialized Marine and MOS is the Aviation Combat Element (ACE). The ACE relies on these Marines to operate their Air Command and Control specific C2 systems. This cultural insight ensures that the ACE uses a building block approach to the development and employment of C2 systems. The junior Marines who operate these systems will develop into senior COC Operations Chiefs that will have a better understanding of their C2 systems and how they are employed and operated with the Marine Corps and how they in turn will be operated in a Joint environment.

The COC provides a set of capabilities utilized by Marine Corps forces. However, there is no Joint or Marine Corps C2 system training module that promulgates a curriculum for system training. Personnel requirements to operate and maintain the COC shall be based on projected task organizations and standard unit configurations. The MAGTF Integrated System Training Center (MISTC) and Marine Corps Communications and Electronics School (MCCES) have individual and staff training modules for IM personnel however, they are not supported by an overarching program of instruction, prescribed unit training schedules, or aligned with a dedicated MOS that would support a joint C2 career path progression. The Marine Corps Training and Education Command (TECOM) are assisting in the curriculum development for operator and maintenance training. Initial operator and maintenance training for Marine Corps instructors, key personnel, and New Equipment Training (NET) for personnel assigned to units shall be conducted prior to fielding the COC. With regard to C2 training and operations for

intelligence support, a network of related courses which prepare Marines to operate associated/appropriate C2 systems is already in place.

Advancements in hardware, software, and facilities have enhanced our planning and conduct of operations thus reducing our timelines from days to hours. Geographically distant commanders are able to collaborate via Video Tele-Conferencing (VTC) and have access to the latest information and automated planning tools. VTC, email, and collaboration tools has enabled leaders throughout the chain of command to have easier and quicker access to mission critical intelligence, logistics, and other information, enhancing the decision making process.

Conclusion and Recommendations

Military engagements are marked by a fog and friction of war and quick decision cycle. Information on which to make decisions will never be as complete and clear as the commander desires, but the speed and volume with which it can be gathered, processed, and acted on is the critical factor. Technology has allowed us to reduce this decision cycle, but it will only work if the C2 systems are complimentary.

A facility that house and transport the personnel of the C2 system has been an issue for the Marine Corps. Common type facilities do not exist in the Marine Corps. The different ground, logistics, and air command piece together in various configurations and designs their own COC in anything from tents to rigid shelters. Much time, money, and energy is spent in the configuration of COC of each deployment.

Having a current hardware and software suite to support the various command elements of the MAGTF is time consuming and slow to deliver due to the military's acquisition process.

This lock step approach to acquisitions has valid reasons for existing and ensuring the integrity of the acquisition process. However, this process needs to adapt if the military is to gain and maintain its technological advantages on today's battlefield.

The military needs to explore the development and purchase of hardware and software suites that can provide a flexible nonproprietary C2 system that compliments the MAGTF C2 Vision. To fully support this vision the Marine Corps needs to divest itself from legacy network systems and focus resources and efforts into a common hardware and software suite that leverages on the benefits of commercial systems.

The Marine Corps' future operational concepts as addressed in *A Cooperative Strategy for 21st Century Seapower* will be supported by the Marine Corps MAGTF C2 vision. This vision has the potential for being the catalyst to drive the development and procurement of our new C2 systems to support our commanders. The new C2 systems will be challenged in its support to this new vision, but will have to address the limitation in our personnel, training, and hardware and software. As the new C2 systems are developed it is critical to realize that C2 systems cannot be view independently, but must be interdependent of each other. The MAGTF C2 Vision will need to continue the development of strategies that takes advantage of emerging command and control concepts, training, and equipment to fully realize an environment that can meet the commander's intent on the battlefield.

Bibliography

A Cooperative Strategy for 21st Century Seapower, 17 October 2007, <http://navy.mil/maritime>.

Alberts, David S., John J. Garstka, and Frederick P. Stein. *Network Centric Warfare: Developing and Leveraging Information Superiority, 2nd Edition*. New York: Library of Congress, 1999.

Alberts, David S., and Richard E. Hayes. *Power to the Edge: Command and Control in the Information Age (Information Age Transformation Series)*. Georges: Ccrp Publication Series, 2003.

Alberts, David S., *Understanding Command and Control (Future of Command and Control)*. Georges: Ccrp Publication Series, 2006.

Hansen, Eric G. "Digital Command and Control... Just Do It!" *Marine Corps Gazette*, July 2005, 35-36.

Headquarters U.S. Marine Corps. Command and Control. MCDP 6. Washington, DC: Headquarters U.S. Marine Corps, October 4, 1996.

Kahan, James P. *Understanding Commanders' Information Needs*. Santa Monica: Rand Corporation, 2000.

Khalilzad, Zalmay. *Changing Role of Information Warfare: The Changing Role of Information in Warfare (Strategic Appraisal S.)*. Santa Monica: Rand Corporation, 1999.

Mades, John E. "Improving the MAGTF COC Now" *Marine Corps Gazette*, February 2007.

Transformation Planning Guidance, April 2003,
http://www.oft.osd.mil/library/library_files/document_129_Transformation_Planning_Guidance_April_2003_1.pdf (26 January 2008).

U.S. Congress. House. Committee on Armed Services. Posture statement of General Lance Smith, USAF Commander, Joint Forces Command. 110th Cong sess., March 15, 2007.

21st Century USMC Brief – MCCDC September 27, 2007. <https://www.mccdc.usmc.mil/>

Notes

¹ MCCDC, MAGTF C2 STRATEGY, 27 August 2007, [www.ndia.org/Content/ContentGroups/Divisions1/Expeditionary Warfare/Optimized%203%20MAGTF%20C2.pdf](http://www.ndia.org/Content/ContentGroups/Divisions1/Expeditionary_Warfare/Optimized%203%20MAGTF%20C2.pdf), (15 January 2008).

² Chief of Naval Operations and the Commandant of the U.S. Marine Corps and the U.S. Coast Guard, A Cooperative Strategy for the 21st Century, 17 October 2007, <http://navy.mil/maritime>, (12 January 2008).

³ Chief of Naval Operations and the Commandant of the U.S. Marine Corps and the U.S. Coast Guard, A Cooperative Strategy for the 21st Century, 17 October 2007, <http://navy.mil/maritime>, (12 January 2008)

⁴ Headquarters U.S. Marine Corps. Command and Control, MCDP 6 (Washington, DC: U.S. Marine Corps, 4 October 1996, 35.

⁵ MCDP 6, 35.

⁶ MCDP 6, 36.

⁷ MCDP 6, 37.

⁸ MCDP 6, 58.

⁹ David S. Alberts and Richard E. Hayes, *Power to the Edge* (CCRP Publication Series, 2003), 2.

¹⁰ Council, National Research, Mathematics, and Programs. *Realizing the Potential of C4I: Fundamental Challenges*. Washington, D.C.: National Academies Press, 1999, 57.

¹¹ Transformation Planning Guidance, April 2003, http://www.oft.osd.mil/library/library_files/document_129_Transformation_Planning_Guidance_April_2003_1.pdf (26 January 2008), 2.

¹² David S. Alberts and Richard E. Hayes, 3.

¹³ Scott Renner, Building Information Systems for Network-Centric Warfare, C2 Research and Technology Symposium, Washington, DC, June 2003, http://www.mitre.org/work/tech_papers/tech_papers_03/renner_ncw/renner_ncw.pdf (16 January 2008), 1.

¹⁴ Renner, 2.

¹⁵ Renner, 3.

¹⁶ MCDP 6, 65.

¹⁷ Joint Vision 2010, <http://www.dtic.mil/jointvision/history/jv2010.pdf>, (18 January 2008), 16.

¹⁸ Joint Vision 2010, 19.

¹⁹ D. Alberts, J. Gartska, F. Stein, *Network Centric Warfare*, 2nd Edition, August 1999. http://www.dodccrp.org/files/Alberts_NCW.pdf (21 January 2008), 58.

²⁰ John E. Mades, Improving the MAGTF COC Now, *Marine Corps Gazette*, February 2007, 37.

²¹ U.S. Congress. House. Committee on Armed Services. Posture statement of General Lance Smith, USAF Commander, Joint Forces Command. 110th Cong sess., March 15, 2007.

²² Eric G. Hansen, Digital Command and Control... Just Do It!, *Marine Corps Gazette*, July 2005, 35.

²³ John E. Mades, 38

²⁴ John E. Mades, 38.